

ON THE SANITARY URGENCY

—OF THE—

Florida Ship Canal.

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BY JOHN GAMGEE.  
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Science has been retarded by a confusion of tongues. No branch of it illustrates this better than medicine. Imperfect as we must admit natural history classifications to be, and barbarous as are their nomenclature, the defects are more glaring in the field of progressive pathology. Precision of knowledge demands precision of language. We name things long before we understand their nature. Naming them wrongly, or without reference to their most general characteristics, we convey no just idea of their significance, nor of their relations to causal or consequent phenomena.

Read the list of synonyms for that most inadequate expression—yellow fever. Until this was invented last century the more general appellations “bilious fever,” malignant fever—“effects of climate”—and in Spanish or Portuguese—the far better and, perhaps, best of all names, so far adopted—“calenture,” or heat disease, were in vogue. Sailor’s fever, stranger’s fever, “flux” and “dysentery,” with a host of others too numerous to mention, enshrouded the past ravages of this pest in a mystery which baffles the historian, until penetrating beneath the surface of casual research. This Babel, within a century, has confounded yellow fever with land endemics, characterized by yellowness. The bilious remittent of the Mississippi Valley—the yellow disease of this Continent, which is but an aggravated chronic result of malaria, African and West Indian fever,

have all crowded the pages of hasty writers, with the effect of still leaving a remnant of physicians, who believe this plague to be a product of American soil.

Candid men will admit that, until quite recently, the domain of yellow fever discussion and writings might be denominated chaos. No man did more to perpetuate an unfathomable diversity of opinion and thought than La Roche. For five and twenty years he has imposed his illogical and rambling views on American students of medicine. It is time this should cease.

Can we briefly indicate a point of contact, which will further the interest and instruction to be derived from such discussions as I now propose? The prevailing and, undoubtedly correct view is, that no such epidemic afflicts this soil, without the introduction of some foreign element by ships. It is an exclusively naval importation. We shall not discuss whether every vessel has received poison from sea or land. There are persons—*a very few*—who believe that, as in small-pox, a pre-existing case fathers every instance of such sickness. The majority believe that the human system is no essential factor in the production and transmission of this cumulative and virulent poison.

Whatever may be the derivation of the potential element which contaminates the ship, since it reaches all known lands *from the sea*, we may term it *pelagic*.

For a century and more the idea has prevailed that this is a genuine fever—a pyrexia. It is certainly very different from all diseases with definite periods of incubation; periods so definite that, a few hours, if not minutes, count the variations in usual or normal development. These diseases run a distinct and unalterable course, with a peculiarly marked crisis, to be followed by resolution or death. There is so much to be said in favor of yellow fever being a form of simple, and usually, severe poisoning, by material totally extraneous to human development,

in contradistinction to every form of human virus, producing true and specific fevers, that I propose we shall call it—what it surely is—a pest or plague, not a fever. Hence, my name for it—"Pelagic Pest," or "Pestis Pelagia"—plague of or from the sea.

In favor of this designation I shall adduce the views of only one authority. My choice is guided by the fact that Auguste Frederic Dutroulau, the renowned French Naval surgeon, has been quoted repeatedly, by Dr. Chaillé, in opposition to my views. It being understood that I am not discussing the origin of yellow fever I shall not quote the mid-ocean observations of Dutroulau. In the Parisian Archives of Medicine for 1853 he declares the conclusion authorized that "the miasma of yellow fever derives one of its *essential* characters from the influence of the sea."

More recently, in 1868, he testifies that the "primary cause of yellow fever is localized on the sea—an infection proper to certain maritime localities." Even forgetting his earlier and most valuable observations, on yellow fever at sea, on board the *Cuirassier*, and accepting the contagious character of yellow fever, he insists on primarily recognizing, as a duty, the protection of land from infected vessels.

It must therefore be admitted that Pelagic Pest correctly defines that most general feature, distinguishing yellow fever from every other known disease. This is more than can be said for any other name hitherto employed.

Last winter I devoted some time to New Orleans. The impressions left on my mind after a careful survey of the location and experiences of the city, were, that from a geographical point of view, it would have been difficult to have found a site for readier protection from any plague of the sea, whilst surrounded, by the most extensive and prolific sources conceivable, for the development of land epidemics. The solid structures and paving of the embanked civic area, protect inhabitants from immediate soil em-

anations. Winds, however, waft down the streets, in a line with unhealthy marshes, the poison which produces well marked cases of intermittents, and Dr. Gustavus Devron, to whom I am indebted for these and other data, has shown how exempt are the inhabitants of streets, crossing the lines on which atmospheric currents most readily reach citizens' houses.

No wind blows yellow fever up the noble Mississippi. One hundred and ten miles of rapid river would, in itself, afford obstacles to the ocean contamination of New Orleans. But the Gulf beyond, now traversed by fever ships from the Carribbean Sea, through the Yucatan Pass, or from Havana, and much more rarely entering it by the Florida Straits, is in itself a haven of purity—a geographical area, within which the absolute preservation of this noble city, from pelagic contamination, may be surely and permanently consummated.

The Gulf of Mexico receives the waters and debris of rivers which influence its currents, fauna and temperatures. It is swept round by the equatorial current which is moderated by an influx of colder waters, whereby a bottom temperature of  $39^{\circ}$  is obtained in contrast to  $54^{\circ}$  in the Mediterranean. The Gulf Stream, forcing its way past the Keys, bearing with it the genial heat so essential to the life and comfort of millions in Europe, has ever proven the friend of the mariner and preserver of ships crews, by carrying them into cooler latitudes.

The accurate and extensive investigations, relating to the Atlantic and the Mexican Gulf;—the services unequalled, and unmarked by any token of a Nation's gratitude, of that most learned, most modest and most zealous student of the sea—Commander Maury;—the arduous labors of the officers of the Coast Survey, and the results of the most successful scientific expedition, ever inaugurated by a scientific society, under the leadership of such men as Nares and



Wyville Thomson, afford us material for a just insight into the main features of marine phenomena and their influence on life.

Dr. Turner has rendered it quite unnecessary for me to discuss, the pernicious conditions under which human beings still float from land to land. To these and to these mainly, we owe the possibility of pelagic infection devastating not only crews, but all confined spaces on sea and land, which are, directly or indirectly, accessible to the emanations of a foul vessel. The freight cars of railroads have carried these as far as Louisville and beyond, and I commend to your attention Dr. J. W. Holland's report and map on this one point.

Admitting, therefore, that vessels, especially the wooden craft of the *New World*, are unfit abodes for man anywhere, the consequences may be surmised of any specific contamination, whether by a pure contagion like small-pox, the transmitting elements of relapsing fever—as amongst the Irish emigrants of 1847—or of the putrid bilge, due to tropical Atlantic waters, removed from oxygen and Nature's unceasing cycle.

What is that cycle? In the tropics, with a mean surface heat of  $75^{\circ}$  to  $80^{\circ}$ , abundant evaporation establishes ocean currents from the Arctic and Antarctic, which, whilst lowering to below  $39^{\circ}$  the bottom temperature, induce vertical and horizontal variations, essential to the economy of the universe.

The vertical influences may be briefly stated as consisting in high density of surface water, with an abundant supply of oxygen, amounting to 33 or 35 per cent. An exuberant development, within reach of atmospheric influence, of a marine fauna comprising globigerinæ, which are not only most abundant but largest in the warmest waters, and still more limited by temperature in their distribution, are the forms of *Pulvinulina*. The structureless flesh or sar-

code of these animals, constitutes the food of swarms of other pelagic animals, and, as with the structure of higher organisms, it is constantly decaying; swarms are, at each instant, perishing; their calcareous skeleta gravitate to the bottom and form the ocean bed, which, according to depth, presents a varied structure. In the regions of globigerina ooze, the beautiful microscopical characters of a "new chalk" are discernible, with some, not many, living creatures. A little deeper the degeneration has advanced further, characterizing the grey ooze of the Atlantic bed, and, deeper still, is a red clay, the product of very simple chemical changes in the organic deposit, which Mr. Buchanan seems successfully to have repeated in the laboratory.

Down in the lowest depths, the colder waters, from the poles, bear more oxygen essential to the chemical changes, than is to be found in the intermediate ocean layers. The amount is much less than on the surface, but it is more than at an average of 300 fathoms, at which point it attains a minimum. Thus says Sir Wyville Thomson: "In deep water, a wide intermediate zone between the surface and the layers immediately above the bottom is nearly destitute of animal life—at all events, in its higher manifestations."

With a steadily descending temperature from the surface to the sea-bottom, there is a progressive diminution in the number, size and variety of living forms. The Atlantic has a mean depth of 2,000 fathoms, so that an idea may be formed of the singular contrasts presented by a section of the living upper strata, the relatively lifeless middle, and the deeper laboratory of physical and chemical transformations raising in æons the ocean bed.

The balance of nature is modified, in its apparent phenomena, by the slightest appreciable conditions. This may be illustrated by the contrasting forms of pelagic animals, on either side of the Isthmus of Panama. A difference of one



degree of surface temperature, between the tropical Atlantic and Pacific, is one of the obvious data, giving us a clue to the different manifestations of disease, in the two oceans near the line. It has been attended, since the probable severance, of a common bed of shallow waters, by uprising lands in tertiary, or post tertiary times, by such a variation in the evolution of creatures from a common stock, that the specific characteristics, of sea-urchins and other animal forms, now demonstrate a complete isolation and contrast of the faunæ of the two oceans. Nature's wheel revolves more rapidly the warmer the sea. Where there is most life we have most death, but, whatever may be the degree, as the chemist Dumas has said, there is an eternal round in which death is quickened and life appears, but in which matter merely changes its place and form.

There is one distinctive feature of the ocean which must be borne in mind, in relation to the subject under discussion. It is the great scarcity of plant life—the few algæ add little to the *sargasso*, in the way of plant shelter and support for quaint and parasitic animals.

Vessels sailing for the equator, from north or south, pass from cold to temperate and from temperate to warm latitudes. They are struck as they advance by the increasing phosphorescence of the sea, which attains to such brilliancy, that the agitated waters, surrounding a moving ship, rival and exceed the starry heavens in brilliancy, and enable a person to read small print on deck. Numerous pelagic animals emit this light, and it has been thought by a French Physician that one creature, *Noctiluca Miliaris*, specially phosphorescent, was the critical element inducing yellow fever by its death and decay in the stagnant bilge. This with many other intricate points may possibly be made the subject of special experiment and prolonged research. My object to day is to insist on the conditions, established by science, in relation to the distribution of heat and living or-

ganisms, on surface ocean waters, and which tend to the increasing danger, of a special and intense bilge-foulness, as ships approach and are detained within the belts of tropical calms.

A prolonged and unceasing study of this question, in all its bearings has tended to impress on my mind the probable truth of a generalization, which may one day procure for its author a just renown. In a note on the last page of a work published in 1856, on the Basis of Medical Science, by Dr. J. C. Faget of New Orleans, there is a casual, but trenchant, distinction drawn between the *atrabiliary fever* of *animal origin*, yellow fever, and the paludal fever, intermittent of *vegetable origin*. The probabilities are that the putrescent water crammed with Sarcodæ, near or within the tropics, is the true parent of yellow fever infection, just as we know that vegetable decay surrounds this city with agues and bilious remittent. The sea is the home, par excellence, of perishable animal forms, whereas the soil or humus is the product of a plant decomposition, which attains undue and dangerous proportions with excessive heat and moisture.

The practical conclusion to be drawn from the very brief exposition I have made is that a ship, to be kept healthy, must be driven fast through the dense beds of pelagic life, or kept out of them as much as possible. It is fortunate that the dangerous area is confined to the Atlantic, but, unfortunately for New Orleans, the nearest approach to the mouth of the Mississippi, from the sea, for many vessels, has been through the Caribbean Sea, and in the direct course of the equatorial current.

A look at the map will show you, that vessels, from the north and north-east, need not descend below the 30th parallel of latitude to reach that of this city. The Tropic of Cancer, the dangerous West Indian seas, the hot Caribbean, need not be traversed if the base of Florida be provided with

a channel, a great highway, draining nearly a thousand square miles of fertile lands, and hastening the transport of emigrants and merchandise to and from the Gulf ports. So great, so paramount, have the advantages of this great work appeared to me, since first studying the probable results—in relation to yellow-fever extensions—of cutting the Panama Canal, that I could not resist adding to the weighty reasons already assigned for the construction of the Florida Ship Canal—those which a naturalist and sanitarian may justly emphasize and enforce.

Since 1855, when a Report, on Survey for a Ship Canal Across the Peninsula of Florida, was published by the Corps of Topographical Engineers, the country has attained to commercial developments which indicate that whatever conclusions were then arrived at, as to the value of this canal, time has indicated, that the results, in the future, are likely to exceed the most sanguine anticipations of enthusiastic promoters. I must ask you, however, to cast your eyes on a table of figures, for which I am indebted to the Chief of the Statistical Bureau of the U. S. Treasury. Immediately after the route for the Canal was surveyed, immigration fell from 51,169 persons, in 1854, to 20,388, in 1855, and last year it had dropt by a rapidly-descending scale to 3,297.

*Statement showing the total number of Passengers arrived in New Orleans from Foreign Countries during each year from October 1, 1819, to December 31, 1879.*

Years.	No.	Years.	No.	Years.	No.	Years.	No.	Years.	No.
1820 <sup>a</sup>	911	1834 <sup>c</sup>	4,035	1849 <sup>a</sup>	25,209	1863 <sup>c</sup>	.....	1878 <sup>c</sup>	3,170
1821 <sup>a</sup>	591	1835 <sup>c</sup>	3,552	1850 <sup>a</sup>	34,080	1864 <sup>c</sup>	.....	1879 <sup>c</sup>	3,297
1822 <sup>a</sup>	438	1836 <sup>c</sup>	4,966	1850 <sup>b</sup>	16,989	1865 <sup>c</sup>	.....	Total	628,446
1823 <sup>a</sup>	1,058	1837 <sup>c</sup>	8,683	1851 <sup>c</sup>	52,011	1866 <sup>c</sup>	3,572		
1824 <sup>a</sup>	1,014	1838 <sup>c</sup>	7,434	1852 <sup>c</sup>	32,302	1867 <sup>c</sup>	6,770		
1825 <sup>a</sup>	429	1839 <sup>c</sup>	10,306	1853 <sup>c</sup>	43,028	1868 <sup>c</sup>	4,028		
1826 <sup>a</sup>	1,100	1840 <sup>c</sup>	11,085	1854 <sup>c</sup>	51,169	1869 <sup>c</sup>	5,496		
1827 <sup>a</sup>	1,341	1841 <sup>c</sup>	10,700	1855 <sup>c</sup>	20,388	1870 <sup>c</sup>	5,329		
1828 <sup>a</sup>	1,958	1842 <sup>c</sup>	12,922	1856 <sup>c</sup>	18,758	1871 <sup>c</sup>	7,256		
1829	3,044	1843 <sup>d</sup>	6,055	1857 <sup>c</sup>	21,299	1872 <sup>c</sup>	7,257		
1830 <sup>a</sup>	2,287	1844 <sup>a</sup>	3,899	1858 <sup>c</sup>	13,539	1873 <sup>c</sup>	7,549		
1831 <sup>a</sup>	3,191	1845 <sup>a</sup>	15,537	1859 <sup>c</sup>	11,322	1874 <sup>c</sup>	3,736		
1832 <sup>a</sup>	4,397	1846 <sup>a</sup>	22,148	1860 <sup>c</sup>	13,080	1875 <sup>c</sup>	3,053		
1832 <sup>b</sup>	.....	1847 <sup>a</sup>	34,803	1861 <sup>c</sup>	958	1876 <sup>c</sup>	2,877		
1833 <sup>c</sup>	4,785	1848 <sup>a</sup>	19,299	1862 <sup>c</sup>	.....	1877 <sup>c</sup>	2,630		

<sup>a</sup> Fiscal years ended Sept. 30. <sup>b</sup> Quarter ended Dec. 31. <sup>c</sup> Years ended Dec. 31.

<sup>d</sup> 1st, 2d and 3d quarters of 1843.

BUREAU OF STATISTICS,  
November 22, 1880.

JOSEPH NIMMO, JR.,  
Chief of Bureau.

If you look back you will find that whenever emigrations rose, so yellow fever mortality attained a maximum. In a few months the European Peasant heard of the dangers attending a visit to this region. He was driven from fields of industry where, in health, he might easily have thrived, but he has preferred to brave hard winters and the labor of clearing woodlands, to risking the lives of himself and family, in a yellow fever country.

The great epidemic of 1853, undoubtedly introduced by an emigrant vessel, the Northampton, direct from Europe

to New Orleans, via the Caribbean Sea, created such a panic, in this country and in Europe, that direct voyages to the South and the Mississippi Valley were abandoned, for a safer entrance via New York to the Western States.

I regret that I am compelled to limit this fruitful field of discussion, owing to the time allotted to the reading of this paper, but the silent figures before you are eloquent beyond any words of mine. They point at once to the vast importance of establishing a straight and speedy line of transit from Europe to this port, and a saving of nearly a week's time, with exclusion from tropical waters, signifies the permanent raising of the health standard of Gulf ports, and especially of this great commercial emporium.

In the 1855 Report, the important and obvious connexion, which the construction of this canal has with Gulf commerce, was stated as follows :

"1st. Saving a large proportion of the insurance now imposed upon it by the Florida Straits."

"2d. Avoidance of a perilous navigation."

"3d. An important saving of time; hence, of interest on capital engaged in this trade."

It is needless to allude to strategical advantages foreshadowed, although the war, which so soon followed the surveyor's words, proved that it would be well for this country to have more than one pass between the Atlantic and the Gulf.

Last session a Senate Document (No. 154) was printed, entitled "Report of the results of an examination made of the peninsula of Florida with a view to the construction of a ship-canal from Saint Mary's River to the Gulf of Mexico." In this encouraging preliminary report, Col. Q. A. Gillmore says that, unless it can be shown "that there is likely to be a very large increase of freights, seeking this route at no distant day, the construction of the canal as a private enterprise should be regarded as commercially infeasible."

On the other hand, the Col. has directed attention to the



westward extensions of farming; to the yearly increase in wheat production, and to the conditions which may revive trade on the Mississippi. He says:

"This westward movement of the grain center causes Saint Louis to grow in importance, as a receiving and distributing depot of cereals, while the cost of transporting grain from the West by rail to Eastern ports will correspondingly increase.

"The British and Canadian Governments are making great efforts to secure as large a portion as possible of the carrying trade of the West, by improving its water routes to the seaboard. Within three years from the present time, the completion of the Welland Canal enlargement will enable British steamships, of about 2,000 tons, to receive their cargoes of grain and provisions at Chicago and other lake ports, and carry them directly to Europe.

"In the present condition of the lakes and Erie Canal line, the average cost of carrying wheat from Chicago to New York is 8.15 cents per bushel.

"By the enlargement of the Canadian canals, to be finished within a few years, British vessels can afford to carry grain from Chicago to Montreal for 6 cents per bushel; and Montreal is 250 miles nearer than New York to the European Market.

"The British and Canadian Governments have nearly completed works which will cost over \$30,000,000, in addition to earlier improvements on which \$24,000,000 were expended, making a total of over \$54,000,000 spent in order to control, as far as possible, the carrying trade of our grain-raising States.

"With the completion of this cheap foreign water route, penetrating into the very heart of our agricultural region, the United States will possess no transportation line that can compete with it on equal terms, unless the Mississippi river is improved, and all obstacles are removed that stand in the way of the most economical transportation to foreign and domestic markets, of the surplus products of the Mississippi Valley.

"With the improvement of this southern route accomplished, the Mississippi River will become the great and successful competitor of the Canada water line, for the reason that the center of the grain region is gradually working away from the latter. Moreover the northern route will be closed by ice during five months in the year, while the other will be open at all seasons.

"From a national point of view a Florida Ship-Canal is an object of importance, as part of a comprehensive scheme for improving and cheapening our means of water transportation from the heart of our grain and cotton-growing regions to foreign ports, and there would seem to be as little need of attempting to fix its rentable or money-earning value, as in undertaking to apply the same rule to the works of river and harbor improvement, prosecuted by the United States Government."

"In the case of the Canadian Canals it is not pretended that they *pay* from a merely mercantile point of view. The chief Engineer of public works of the Dominion of Canada, in his report on the navigation of the river Saint Lawrence, July 9, 1874, says:

"It is well known that none of the (Canadian) canals have paid the interest of the money expended in their constructions, or indeed very little more than the working expenses connected with them. Still, few who compare the past with the present condition of Canada, will doubt (but?) that they have been of far greater benefit to the country than the aggregate amount of their cost."



What more need be said to stimulate American enterprise, and to urge Congress to further any practical project, whereby life and commerce, in the South and West, may reap all the benefits of this Canal? New Orleans is naturally a healthy city. The records of operative surgeons, the experiences of such men as Andrew W. Smyth, who fear no ærial germs, and do not practice what is called antiseptic surgery, indicate that putrefaction is subordinated here in Nature's cycle, and that pestilential emanations—apart from the marsh intermittents—are foreign to this region, and, indeed, to this Continent. Yellow-fever is not a disease of the American Continent. Let us, therefore, secure to New Orleans all the advantages of its latitude and its climate, of the fast-flowing river in front of it, and the wholesome Gulf beyond. Ships reaching Fernandina, whilst tracing along either of the routes marked on the accompanying map, will be under inspection, and can be purified before they cross the Gulf to reach the mouth of the Mississippi. This advantage alone should command the unanimous support, not only of the Gulf ports, but of the entire valley of the Mississippi, and of the National Government.

The genius of Americans has been manifested in the gradual, but remarkable, development of an inland navigation which, when complete, and it is estimated that 95 per cent of the circuit is now ready, will bring a ship from New York to New Orleans, without passing into the Atlantic or the Gulf. She may then ascend the Mississippi, and pass round by Chicago and the Lakes, through the Erie Canal to New York again. The first man who ever cut and navigated a canal exclusively by steam, Mr. Marshall Parks, of Norfolk, Virginia, President of the Albemarle and Chesapeake Canal, tells me that a little over \$100,000,000 would probably cut all the canals needed to take advantage of natural navigation and complete this magnificent circuit. Mr. Parks, whose methods were made



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available even in cutting the Suez Canal, for French engineers were sent to inspect his works, assures me that with a very small force of men, large steam dredges might cut the Florida Canal, giving a breadth of 300 feet and a depth of 30 feet in three or, at most, four years. Skill and experience for this work abound. The engineers' estimates need not be exceeded; and whilst the French are cutting the Panama Canal, with the certainty of extending the yellow fever area, it is hoped the people of this country will contract that area, and favor their great Inland and International commerce, by securing to this latitude all its natural advantages. Cut the Florida Ship Canal, and, with common care, New Orleans will enjoy the same immunity from yellow fever as ports on the Atlantic shores. Then, the iniquity of fouling Cuba, by a constant influx of Spanish soldiers and filthy ships, will become more apparent, and lead to measures calculated to benefit the Antilles, as much as the Gulf ports and the great valley of the Mississippi. Let us rise from a paltry trifling with a gigantic evil, and in a statesmanlike manner insist on the broadest treatment of so great a question. The efforts of the Auxiliary Sanitary Association are worthy of all praise. Let them be seconded by essential co-operation beyond the narrow limits of this City and State.

RIGGS HOUSE,

*Washington, D. C., December 2d, 1880.*